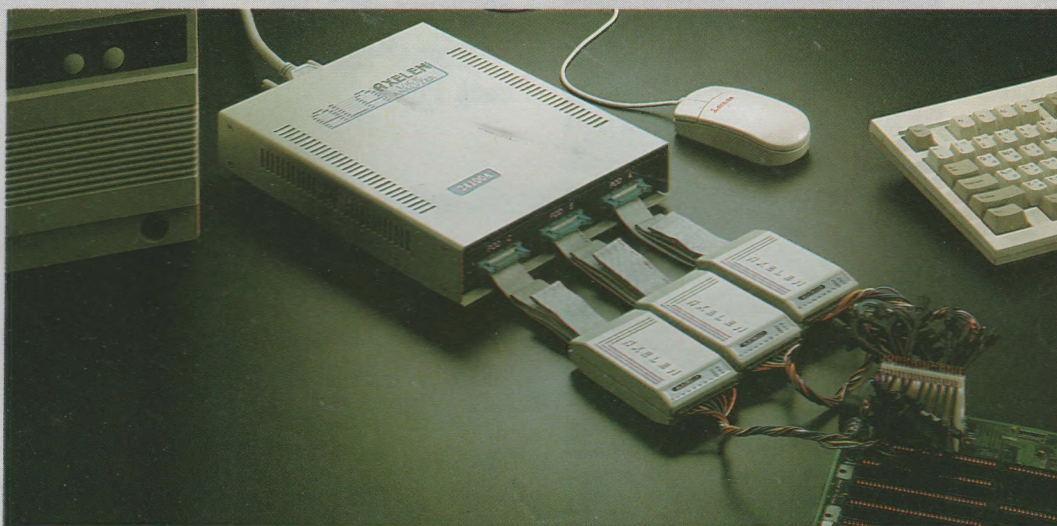


AXELEN ALA

LOGIC ANALYZER 24100A



ALA24100A - AXELEN LOGIC ANALYZER

- * EXTERNAL PC-BASED LOGIC ANALYSIS SYSTEM
- * FOR VGA/EGA/CGA/HGA/MCGA DISPLAY.
- * 24 CHANNELS; 100MHZ.
- * EASY-TO-USE MENU DRIVEN SYSTEM SOFTWARE
- * MORE THAN 4,000 MULTILEVEL COMBINATIONS OF TRIGGER CONDITION.
- * DATA QUALIFICATION: 8 CHANNELS QUALIFIER
- * DISPLAY MODES: FORMAT, TIMING, LIST, DOS.
- * FOR IBM PC / XT / AT OR COMPATIBLES

FEATURES:

- * CHANNEL NO./MEMORY DEPTH/MAX SAMPLING RATE.
INT CLOCK -from 50MHz to 100MHz in 5,2,1 sequence, and 25MHZ special, total 18 steps.
8ch/8176 words/100MHz
16ch/4088 words/50MHz
24ch/2044 words/up to 25MHZ
- EXT CLOCK - rising or falling
24ch/2044 words/up to 25MHZ.
- * POWERFUL TRIGGERING CAPABILITY
 - four levels Sequential-trigger
 - three trigger commands(IF-THEN, AND,OR) and four trigger words available.
 - more than 4,000 combinations of Trigger Conditions.
- * TRIGGER DISPLACEMENT
 - from 0 to full memory depth
- * QUALIFIER-POD C; 8 Bits; Sampling Rates up to 25MHZ, INT or EXT; Qualifier States: "0", "1", "X" (don't care).
- * 16, 24 USERS DEFINED CHANNELS IN TIMING MODE.
- * REPEAT TRACE
- * GET/UPDATE TRACE TEMPLATE.
- * FAST SCROLLING AND PAGING-Both TIMING and LIST Mode.
- * QUICK SEARCH, REPEAT SEARCH AND LOCATE FEATURES-Both TIMING and LIST Mode.
- * INDEPENDENT BIN, OCT, HEX, ASCII BASES for each POD in LIST Mode.
- * POWERFUL PC AND DOS ENVIRONMENTS INTERFACE:
 - VGA/EGA/CGA/HGA/MCGA or Compatibles Display.
 - Load or Save a traced data file to any disk drive and any directory.
 - Load or Save a trigger template file to any disk drive and any directory.
 - Provides DIR, RENAME, and ERASE commands to any file.
 - DOS Shell
- * SMART EDIT FEATURE - set up your testing document in data files.
- * HARD COPY.

DISPLAY INTRODUCTION:

MENU DRIVEN OPERATION SYSTEM:

1. Main Menu Bar
2. Operation Window
3. Quick Reference Line

FORMAT MODE:

- * Quick setting by Flashing-Cursor;
- Powerful Sequential-Triggering function to satisfy all your needs.

"GET" FUNCTION & "UPDATE" FUNCTION

- * They are used to Read/Write a traced template From/To the buffer.

TIMING MODE:

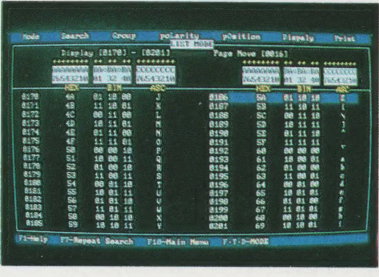
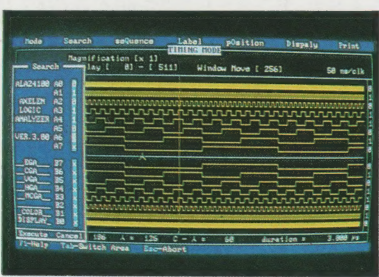
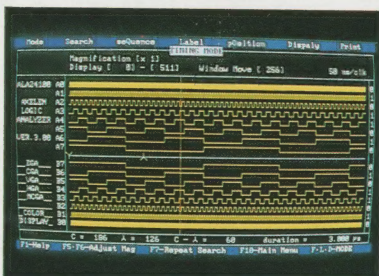
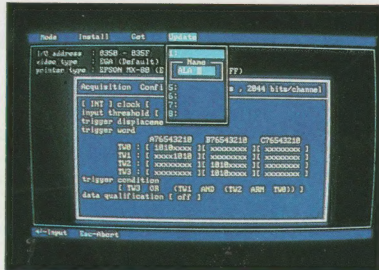
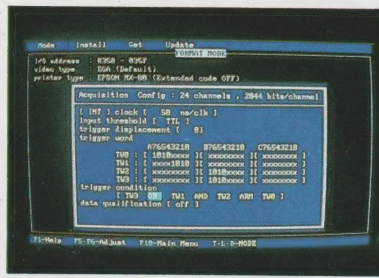
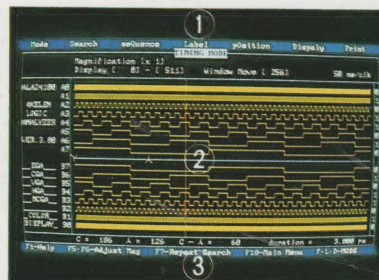
- * Display the timing diagram of 16/24 user defined channels.

"SEARCH" FUNCTION:

- * To SEARCH a data Pattern in Trace memory.

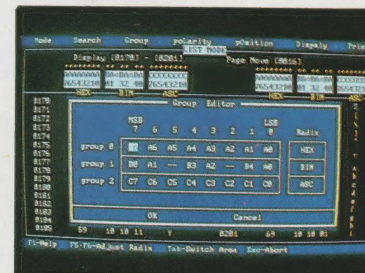
LIST MODE:

- * Display the traced data in STATE form.



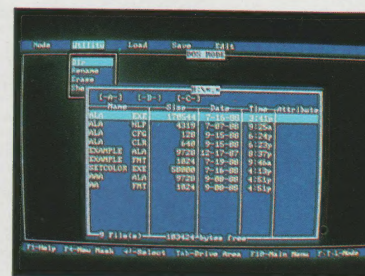
"GROUP" FUNCTION:

- * Change the Channel Sequence and the Display Radix of each Pod.



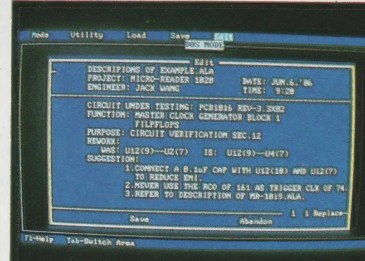
DOS MODE:

- * Window-Dos provides all kind of files operation commands: "DIR", "RENAME", "ERASE", "LOAD", "SAVE".



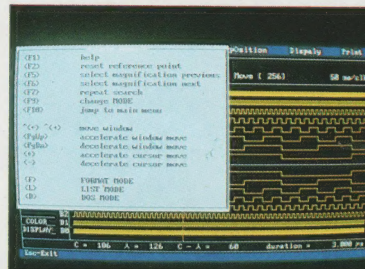
SAMRT EDIT FUNCTION IN DOS MODE:

- * Set up your testing documents in data files.



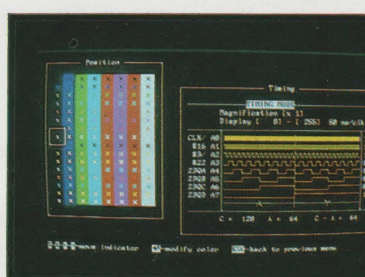
HELP MENU:

- * To help you operate ALA24100A System without memorizing operating keys in any mode.



COLOR-SETTING FUNCTION:

- * Users can setup the Color Combination up to their favors.



PACKAGE INCLUDES:

- * ALA Analyzer Main Unit(ALA)
- * 3 Logic Pods with Flat Cable
- * Interface Adaptor
- * Communication Cable
- * Analyzer Operating System Disk(AOS)
- * ALA Operation User's Manual
- * Accessory Bag

****ONE YEAR WARRANTY****

PREFACE

For the pleasure of vision, for the clearness of viewing, and for the convenience of operation, people always prefer to use a more colorful and more user-friendly instrument rather than a kind of an "artificial" one. The AXELEN LOGIC ANALYZER (ALA) is a new kind of logic analyzer which is designed to satisfy all your requirements for a logic analyzer. It not only shows a high-level logic wave to the user when he is using a VGA or VGA display adapter, but also provides a color setting ability for the user to set his own favorite color combination. So you will find the new AXELEN will bring you to a brand-new aspect of instrument operation.

AXELEN LOGIC ANALYZER (ALA)

24100A

Operating Manual

Version 3.00/A

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AXELEN INDUSTRIAL INC.

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Taipei, Taiwan, R.O.C.

PREFACE

For the pleasure of vision, for the clearness of viewing and for the convenience of operation, people always prefer to use a more colorful and more user-friendly instrument rather than a Mono or an arduous machine. As the progression of hardware and software technology of computer world, COLOR IS NO LONGER THE RIGHT OF CAD. Now we, **AXELEN**, present you a colorful and much more user-friendly Analyzer Operating System (AOS) version 3.00 to satisfy all your requirements ever before. In this version, AOS not only shows a pre-defined color screen to the user when he is using a EGA or VGA display adaptor, but also provides a color setting utility for the user to set his own favorite color combinations. So you will find the new AOS will bring you to a brand-new aspect of instrument operation.

AXELEN INDUSTRIAL INC.

Nov. 1988

Warranties

The Hardware of this Axelen Logic Analyzer (ALA) is warranted to be free from defects in provided functions for one year from the date of shipment from Axelen Industrial Inc. or the authorized dealer.

The Software Disk of this Axelen Logic Analyzer (ALA) is warranted to be free from defects in provided functions for 90 days from the date of shipment from Axelen Industrial Inc. or the authorized dealer.

Any Hardware or Software Disk defects caused by misuse or abuse are not covered.

This Operation Manual is for information purposes only and is subjected to change without any notice.

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CHAPTER 1 SYSTEM INTRODUCTION

Today logic analyzers are found throughout the electronics world they are widely used as a tool for design, evaluation manufacture and maintenance of digital equipment.

The **AXELEN LOGIC ANALYZER** (abbreviated in **ALA**) 24100A is a PC based, general-purpose digital debugging and troubleshooting tool 24 channels, 100 MHz, data qualification and powerful trigger conditions will give you much more satisfactory variety and flexibility than you ever needed before. Through the dedicated interface adaptor and the well-designed operating software, you will find it is a fantastic job to operate the ALA system.

1.1 About This Manual

This manual consists of 9 chapters. Chapter 1 is the system introduction. This chapter will describe the system features, system requirements and system contents. Chapter 2 "System Installation" discusses the hardware and software installation. Chapter 3 "Operation Introduction" explains the terminologies used in this manual and explains the basic operation of this menu driven software.

Chapter 4 to chapter 7 are about the four modes of ALA basic structure. These four chapters explain the meaning of the operation of each function under each mode.

Chapter 8 "Hardcopy" guides the user how to make a hardcopy of the screen at any moment.

Chapter 9 "Set Color" gives the user a clear explanation about the color setting while the user using a EGA or VGA display adaptor.

The last part of this manual is the Appendix A: "Trace Procedure" and Appendix B: "Format of the ALA Data File". In the Appendix A, we will describe the trace procedure of ALA system, and at the same time, we will explain the file format of a ALA data file in the Appendix B for the users to use it in some additional processes.

1.2 System Features

ALA 24100A provides the following features:

- * 100 MHz
- * Channel number

- o 24: 40nsec/clock or below as the sample clock
- o 16: 20nsec/clock as the sample clock
- o 8: 10nsec/clock as the sample clock
- * Memory depth
 - o 24 channels : 2044 bits/channel
 - o 16 channels : 4088 bits/channel
 - o 8 channels : 8176 bits/channel
- * Powerful trigger conditions
 - o Four trigger words
 - o Three trigger command: "ARM" (IF-THEN), "AND" and "OR"
 - o Over 4000 trigger combinations
- * Powerful PC and DOS environments interface
 - o ALA can be run on the Hercules, CGA, EGA, VGA, MCGA or compatible adaptors.
 - o Load or save a traced data file to any disk drive and any directory.
 - o Load or save a trigger template file to any disk drive and any directory.
 - o ALA provides DIR, RENAME, and ERASE commands to any file
 - o DOS shell
- * Powerful print out utility
 - o Hardcopy at any moment
 - o Dump whole trace memory to the printer as the following format: Timing diagram, or List state diagram

1.3 System Requirements

Computer

An IBM PC, XT, AT, or Compatible with one 360KB or 1.2MB floppy-disk drive.

Memory

The minimum RAM to run ALA is 384K. When more memory is available (up to 640KB), it is used to increase the operating function.

Display adaptor

Hercules, CGA, EGA, VGA, MCGA or Compatible.

Output Device

An Epson FX-80, MX-80 or compatible dot-matrix printers.

Operating System

IBM PC DOS or MS DOS version 3.10 or above.

1.4 System Contents

- o ALA System Unit

- o 3 Logic PODs with the Flat Cable
- o Interface Adaptor
- o Connection Cable
- o Analyzer Operating System (AOS)
- o ALA Operation Manual version 3.00

1.5 Analyzer Operating System Disk Contents

- o ALA.EXE
- o ALA.HLP
- o ALA.CFG
- o ALA.CLR
- o EXAMPLE.ALA
- o EXAMPLE.FMT
- o SETCOLOR.EXE
- o README.DOC

1.6 System Specifications

- o Repetition Rate: INT clock, 100 MHz maximum
EXT clock, 25 MHz maximum
- o Input Channels: 24 channels maximum
- o Input Threshold: TTL, fixed at +1.5V
ECL, fixed at -1.3V
Variable from -10.0V to +10.0V, 0.1V/step
- o Maximum Input: +/- 25V (absolute maximum rating)
- o Input Impedance: 12K ohm minimum
- o Set Up Time: 0 ns, before active edge of EXT clock
- o Hold Time: 5 ns, after active edge of EXT clock
- o Sample Clock:
 - INT clock operation:
from 500 Hz to 100 MHz in 5,2,1 sequence and 25 MHz
special, 18 programmable steps
 - EXT clock operation:
25 MHz maximum, RISING or FALLING edge
- o Pulse Width
of EXT Clock: 10 ns minimum, both high and low ?
- o Triggering:
 - Trigger words: 4 words maximum
 - Trigger states: "0", "1", "x" (don't care)

Trigger commands: ARM (if-then), AND, OR
Trigger levels: 4 levels maximum

o Data Qualification:

Sample clock rate: 25 MHz max., INT or EXT
Qualifier channels: POD C, 8 channels
Qualifier states: "0", "1", "x"(don't care)

o Trigger Displacement: from 0 to full memory depth

o Memory Depth: 8176 bits/channel maximum

o Summary of Acquisition Configuration:

The acquisition configuration will be changed if the Data Qualification is enabled, or INT clock is set at 50 MHz, and 100 MHz. The changes are listed in the following table:

	INT at 100MHz	INT at 50MHz	INT/EXT =< 25 MHz	
			Nonqualified	Qualified
Channels of data	8	16	24	16
Channels of qualifier	not available	not available		8
Trigger words (max.)	1	2	4	4
Trigger levels (max.)	1	2	4	4
Memory Depth (bits/channel)	8176	4088	2044	2044

1.7 System Characteristics

o Power Supply:

The required power of ALA 24100A is drawn from computer, the maximum load current of four power levels are listed as following:

+ 5 V DC	1.60 A	(stand by)
	2.10 A	(TRACE operation)
- 5 V DC	0.10 A	
+12 V DC	0.03 A	
-12 V DC	0.03 A	

NOTE: Load current is measured by all three Logic PODs are attached.

- o Dimensions: Length 270 mm
 Width 210 mm
 Height 45 mm
- o Weight: Net approx. 1.0 Kgs
 Gross approx. 3.5 Kgs
- o Operational
 Temperature: 0'C to 40'C, 80% RH maximum
- o Storage
 Temperature: -25'C to 60'C, 70% RH maximum

1.8 System Operation Keys

All the operations of ALA are input by keys. This manual will use a consistent symbol to represent operation keys.

1.8.1 Symbols in This Manual

Except the cursor DIRECTION key, the symbol of operation key is defined as <Keys>, no matter it is a single key or a composite key.

For example :

Single Key:

1. cursor DIRECTION key: means $\uparrow \downarrow \leftarrow \rightarrow$
2. <F1>, <F5>, <F6>, <F10>, <Esc>, ...etc.
3. <Tab>: Some keyboards use $\leftarrow \rightarrow$ to represent.
4. <Enter>: Some keyboards use <Return> or <CR> to donate.
5. <Space>: means space bar.

Composite Key:

Such as <Shift> + <PrtSc>, \wedge <C>, or <Alt> + <C>,... etc.
i.e.

<Shift> + <PrtSc> means to hold down <Shift>, then press <PrtSc>.

\wedge C means to hold down <Ctrl>, then press <C>.

<Alt> + <C> means to hold down <Alt>, then press <C>.

1.8.2 Global Keys Definitions

In AOS, we provides two kinds of function keys to the user. One kind is the key function varied with the different MODES, or different conditions. The other kind is the keys having their permanent function definitions, they don't change with the different conditions. We call the latter kind as "Global Keys". Here we want to explain the Global Keys definitions in the following paragraphs.

- <F1>** For user-friendly, ALA supports the On-line Help Window. Press **<F1>**, the screen will open a help window immediately to tell the user how to use operation keys which are available in current function. And press **<Esc>** to exit the help window and go back to the original state.
- <F9>** To invoke the "MODE" function directly.
- <F10>** Switch the cursor from the Operating Window to the Main Menu Bar.
- <ESC>** Switch the cursor from the Main Menu Bar to the Operating Window or abort the execution of any functions.
- <TAB>** Switch the cursor between the "Input Area" and the "Action Area" in the Dialog Box.

CHAPTER 2 SYSTEM INSTALLATION

2.1 BackUp Your Disk

When you get the Analyzer Operating System (abbreviated in AOS) disk, the first thing is to make backup disks.

- o Because the AOS is a non-system disk, if necessary, please format a blank disk to be a system disk before backup.
- o Then, copy all AOS files to the formatted disk.
- o We suggest you to make backup 2 - 3 copies, then, put the original disk in a safe place.

If you want to operate AOS by using hard disk, the backup disk may not be a system disk.

- o Turn on the computer, change logged drive to drive C, and insert AOS to drive A.
- o Key in

```
C>MD C: ALA <Enter>
C>CD C: ALA <Enter>
C>COPY A: *.* C: <Enter>
```

2.2 Hardware Installation

Figure 2-1 is an illustration of ALA 24100A hardware installation, it is called as Analyzer Unit (AU), including the ALA System Unit, one connection cable, one interface adaptor, and three Logic PODs with the Flat Cable.

When you install the hardware, the interface adaptor can be inserted to any slot of the computer. Before you insert the interface adaptor, be sure the power of computer must be off.

When you want to connect the connection cable, please do not mix our cable with RS232 or the printer connector.

Furthermore, ALA 24100A provides three Logic PODs, each POD has 8 input probes, one EXT clock input probe and one GND probe. The 8 input probes are provided for you to connect with test points of target.

Besides connect the input probes with test points, you must also make GND probe be enabled.

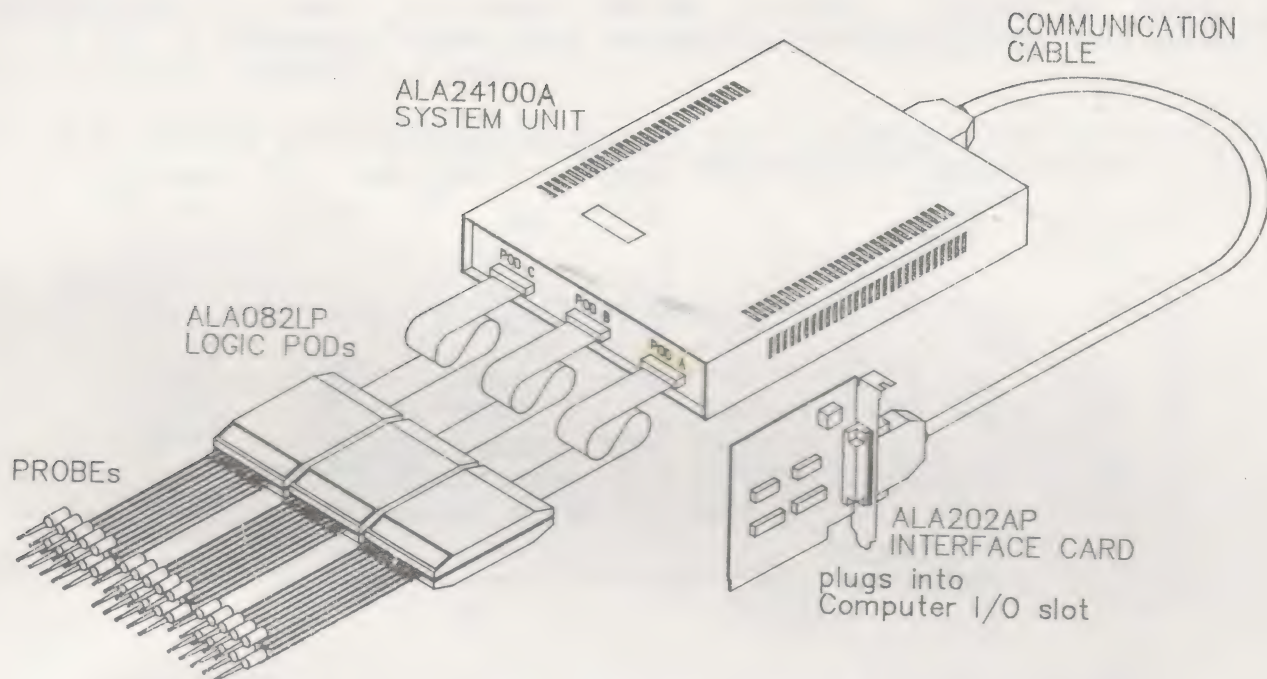


Fig. 2-1 Illustration of ALA 24100A Logic Analyzer

Please be careful: The hardware designs of GND probes of three Logic PODs are connected together, so, you must not connect these three GND probes to different voltages unless the voltages are supported from invariant power supply system, otherwise, you may destroy the ALA 24100A.

```

*****
*   WARNING :                                           *
*   DO NOT LET VOLTAGES EXIST AMONG THREE GND PROBES, *
*   OTHERWISE, YOU MAY DESTROY THE ALA 24100A.         *
*   *****                                           *

```

Although ALA offers three EXT probes, only the EXT probe of POD A could be enabled. Therefore, if you want to use EXT clock, please connect this enabled probe to the test point of your target.

ALA will occupy 16 I/O addresses of computer. In the interface adaptor, we provide a DIP switch to the user to select the proper I/O address set. Refer to the Fig. 2-2, ALA24100A offers 8 sets of I/O address according to the DIP switch combinations. The default address set is from 350H to 35FH (HEX). If you want to change this address set, please read the "Technical Reference" of your computer and try to get which range of I/O addresses is available in

CHAPTER 2 SYSTEM INSTALLATION

2.1 BackUp Your Disk

When you get the Analyzer Operating System (abbreviated in AOS) disk, the first thing is to make backup disks.

- o Because the AOS is a non-system disk, if necessary, please format a blank disk to be a system disk before backup.
- o Then, copy all AOS files to the formatted disk.
- o We suggest you to make backup 2 - 3 copies, then, put the original disk in a safe place.

If you want to operate AOS by using hard disk, the backup disk may not be a system disk.

- o Turn on the computer, change logged drive to drive C, and insert AOS to drive A.
- o Key in

```
C>MD C: ALA <Enter>
C>CD C: ALA <Enter>
C>COPY A: *.* C: <Enter>
```

2.2 Hardware Installation

Figure 2-1 is an illustration of ALA 24100A hardware installation, it is called as Analyzer Unit (AU), including the ALA System Unit, one connection cable, one interface adaptor, and three Logic PODs with the Flat Cable.

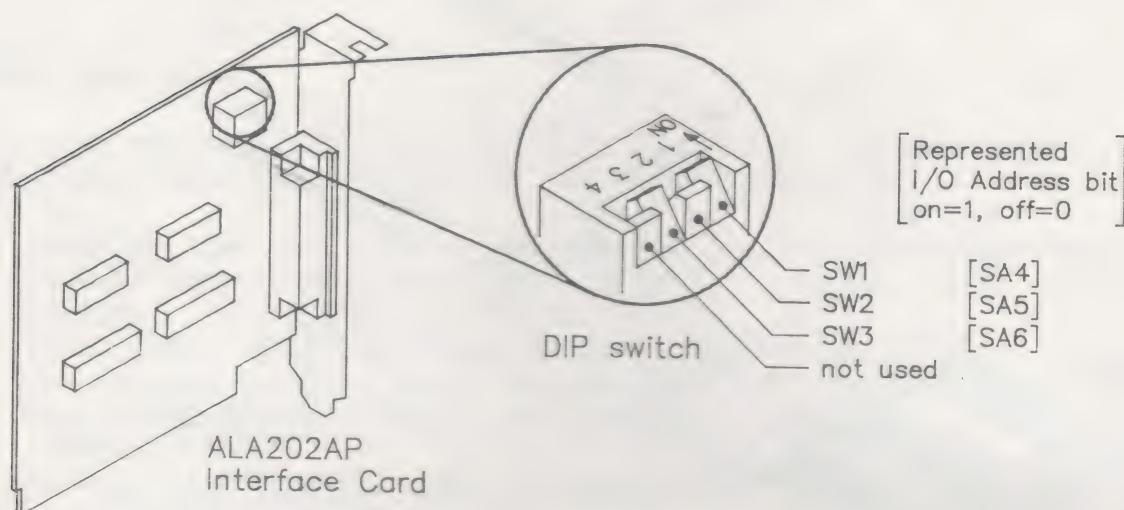
When you install the hardware, the interface adaptor can be inserted to any slot of the computer. Before you insert the interface adaptor, be sure the power of computer must be off.

When you want to connect the connection cable, please do not mix our cable with RS232 or the printer connector.

Furthermore, ALA 24100A provides three Logic PODs, each POD has 8 input probes, one EXT clock input probe and one GND probe. The 8 input probes are provided for you to connect with test points of target.

Besides connect the input probes with test points, you must also make GND probe be enabled.

first priority. SHOULD NEVER conflict the I/O addresses with the PC system or any other interface adaptors.



SW3	SW2	SW1	I/O ADDRESS (HEX)	SW3	SW2	SW1	I/O ADDRESS (HEX)
off	off	off	300 - 30F	on	off	off	340 - 34F
off	off	on	310 - 31F	on	off	on	350 - 35F *
off	on	off	320 - 32F	on	on	off	360 - 36F
off	on	on	330 - 33F	on	on	on	370 - 37F

* Default

Fig. 2-2 I/O Address on the DIP Switch

2.3 Software Installation

ALA provides two ways to customize the AOS to your PC system. The first installation method is for the user who newly receives the ALA system or a new version of AOS. The second method is for a user who want to change the hardware configuration during running the ALA system. The second method will be discussed in the FORMAT MODE chapter. In this section we want to explain how to install the AOS to your PC system if you run current version of AOS at the first time.

- o Turn on your PC power and wait for your PC to boot the DOS.
- o Key in the following command.

A>ALA/i

Note: /i means to config the AOS to your PC system.

- o Now a logon window will be shown on the screen. You just press <Enter> to pass it.
- o A system configuration dialog box will be displayed on the screen to ask you to input the correct parameters. Like the following:

System Config	
I/O address	: [350 - 35F]
Video type	: [Hercules]
Colors set	: [Mono]
Printer type	: [EPSON MX-80]
Extended code	: [OFF]
<div>OK</div> <div>Cancel</div>	

The first parameter of this System Configuration is I/O address which must be proper selected according to your ALA interface adaptor DIP switches. If not, the ALA system won't work properly. Should never use the same address with the other interface adaptors, otherwise, the ALA hardware will be damaged. The available addresses range is that:

300 - 30F
 310 - 31F
 320 - 32F
 330 - 33F
 340 - 34F
 350 - 35F
 360 - 36F
 370 - 37F

You can press <F5> or <F6> to select one address set to meet the system requirement.

Video type and the Colors set is a new function of ALA. We provide the following various combinations to the user:

Video type	Colors set
Hercules	Mono
CGA	Mono
EGA	Mono
	Default
	Turquoise
	Magenta
	Custom
VGA	Mono
	Default
	Turquoise
	Magenta
	Custom
MCGA	Mono

In the same manner, you can press <F5> or <F6> to select one combination of Video type and Colors set to your PC system.

The following parameter is Printer type. You can use <F5> or <F6> to select the correct printer type during running ALA system.

Another printer related parameter is Extended code. This function is used to control whether to print out IBM graphic code (80 - FF in HEX) or not. When you use an IBM compatible printer then you can select "ON", otherwise you should select "OFF" to get a correct printer output.

Whenever you finish this System Config area, you should press <Tab> to switch the cursor from the input area to the action area. In this area you can find there are two commands:

OK : confirm changes and leave the current function.
Cancel: abandon changes and leave the current function.

If you want to save your changes, just select "OK" command; or select "Cancel" to cancel your inputs. If you want to quit during keying in this box, you can press <Esc> at any time to leave this function without any change.

```
*****
* When you finish the Installation procedures and start to run *
* the AOS, the first display screen is the FORMAT MODE, and the *
* cursor must be inverse video form and reside on the field *
* [INT]. *
* *
* IF THE CURSOR IS INVISIBLE, it must be mistaken in configuring*
* the Video type and Colors set. Please check your PC system *
* and do it (ALA/i) again. *
*****
```


CHAPTER 3

OPERATION INTRODUCTION

This chapter introduces the operation of AOS in general. It describes each mode under AOS. In each mode, AOS presents you a menu driven screen, you can find the screen consists of three parts. The first part is called the Main Menu Bar which is always on the upper most line of the screen. You can very easily use the cursor DIRECTION key or the SHORTCUT key to invoke any specific function from this Main Menu Bar. The second part is the Operating Window, for example, the Operating Window in the FORMAT MODE is the acquisition configuration and the trace template; in the TIMING MODE, the Operating Window is the timing diagram. The third part is called Quick-Reference line (abbreviated in Q-Ref line) which appears on the last line of the screen. At any time, it indicates that you can press <F1> to view the on-line help window, and shows what key functions you can get.

In the following sections we want to explain the terminologies used in AOS.

3.1 Mode

AOS contains four operation modes. They are:

FORMAT MODE In this mode you can change the hardware configuration, change the ALA acquisition Configuration and get, edit or update the trace template.

TIMING MODE You can find a timing diagram on the Operating Window, you can analyze the traced waveform by the aid of the functions provided at the Main Menu Bar.

LIST MODE The same as in the TIMING MODE, you can also use this mode to analyze the traced data. But unlike the timing diagram in the TIMING MODE, the LIST MODE puts the traced data in state form and provides a lot of data combinations to help the users very quickly debug or troubleshoot their own hardware and software.

DOS MODE In this mode, AOS provides the operation functions to the disk drives. The user can very easily use the DOS MODE functions to edit the trace comment to a traced data; to load and save a ALA data file or a ALA FORMAT trace template file from or to a disk.

3.2 Operating Window

ALA provides different Operating Windows in each mode except in the DOS MODE. Under the FORMAT MODE, the Operating Window is the acquisition configuration and the trace template; under the TIMING MODE, the Operating Window is a timing diagram; while in the LIST MODE, that is a state diagram.

3.3 Main Menu Bar

In each mode, ALA provides a Main Menu Bar on the first line of the screen, that line contains the names of each function with a highlighted capital letter.

For example, a TIMING MODE Main Menu Bar looks like the following:

Mode Search seQuence Label pOsition Display Print

You can find several functions in this Main Menu Bar, and a highlighted capital letter in each function. In AOS you have two ways to select a function from Main Menu Bar, you can use either one at your convenience.

3.3.1 Cursor

When your cursor is in the Operating Window, do the following procedures:

1. Press <F10> to switch the cursor from Operating Window to the Main Menu Bar.
2. Select the specific function by pressing the cursor DIRECTION key or just press the capital letter.
3. Press <Enter> to invoke that function.

When you are in the Main Menu Bar already, pass procedure 1, just go from 2.

3.3.2 SHORTCUT Key

Another way to invoke the function of Main Menu Bar is that:

Press <ALT> + <Highlighted Capital Letter>.

That is a composite function key, means that you press and hold the former key, and then press the latter key one time.

3.4 Quick-Reference Line (Q-Ref Line)

This line always appears at the last line of the screen. In this line, you can find the available key definitions at any moment. This line is abbreviated in Q-Ref line at the rest of this document.

3.5 Pull Down Menu

Most of the functions you select from the Main Menu Bar will give you a Pull Down Menu, that seems a menu screen is pulled from the bottom of the corresponding function.

When you invoke the Mode function in the Main Menu Bar, a Pull Down Menu is as the following:

TRACE
REP TRACE
FORMAT MODE
TIMING MODE
LIST MODE
DOS MODE
QUIT

Now the cursor must reside on the first line TRACE. AOS also provides two ways for you to select.

3.5.1 Cursor

1. Select the specific item by pressing the cursor DIRECTION key.
2. Press <Enter> to enter that MODE.

3.5.2 SHORTCUT Key

Another way to select specific item is just pressing the <Highlighted Capital Letter> of that item. As the above example, if you want to go to the DOS MODE, just press <D>.

3.6 Dialog Boxes

When you select some of functions from the Main Menu Bar or from a pull down menu, a dialog box will appear on the screen if ALA need you to key in some additional information and use the command to confirm your input or just abandon it. For instance, if you invoke the function "Install" in the FORMAT MODE, then a dialog box as the following will appear:

System Config	
I/O address	: [350 - 35F]
Video type	: [Hercules]
Colors set	: [Mono]
Printer type	: [EPSON MX-80]
Extended code	: [OFF]
<div> <div>OK</div> <div>Cancel</div> </div>	

The dialog box contains two parts, one is the input area on the above, the other is the action area on the bottom. In the upper dialog box, you can use cursor DIRECTION key to select the item you want to change. If you finish the input area, then you press <Tab> to switch the cursor to the action area and select "OK" or "Cancel". If you select "OK", then the system will change according to your new configuration. if you select "Cancel", then the system will stay in original configuration and neglect input area changes.

3.7 Prompt Boxes

A prompt box is displayed on the screen when ALA needs you to input some information only without the confirmation command. So a prompt box is quite the same as a dialog box without the action area.

As mentioned above, this prompt box appears on the screen to ask you to input the additional information without any confirmation command. For example, when you want to save a ALA data file into a disk drive, you select "Save" function from the Main Menu Bar and select the .ALA file, then a prompt box appears on the screen,

filename.ALA

this box asks you to input the appropriate file name. Press <Enter> following the filename to finish the communication with this box.

3.8 List Boxes

List box is a kind of display window which lists all the items that match the specifications you have input. For instance, if you want to load a .ALA file into the memory, and you don't specify the exact filename, then ALA will show

you a list box that contains all the .ALA files in the current directory. Like the following:

C:\ALA*.ALA					
[-A-]		[-B-]		[-C-]	
[-E-]					
Name		Size		Date	
Time		Attribute			
..		>UP DIR<		5-06-87 8:37p	
VERSION2 ALA		9728		12-17-87 12:08p	
EXAMPLE ALA		9728		6-25-88 1:50p	
100MHZ ALA		9728		5-03-87 10:27a	
3 File(s) 14182400 bytes-free					

Above figure is a typical list box, that lists the .ALA files in the directory C:\ALA\. At the beginning, the cursor will stay on the first file, you can press the DIRECTION key to move it to the file you want and press <Enter> to load that file into the memory.

CHAPTER 4 FORMAT MODE

4.1 Descriptions

When you invoke the AOS, the FORMAT MODE will be shown on the screen in the very first, like the following screen :

```

Mode      Install    Get      Update
                        FORMAT MODE
I/O address  : 0350 - 035F
video type   : Hercules (Mono)
printer type : EPSON MX-80 (Extended code OFF)

Acquisition Config : 24 channel , 2044 bits/channel

[INT] clock [ 50 ns/clock ]
input threshold [TTL]
trigger displacement [ 0 ]
trigger word

          A76543210    B76543210    C76543210
TW0:  [ xxxxxxxx ][ xxxxxxxx ][ xxxxxxxx ]
TW1:  [ xxxxxxxx ][ xxxxxxxx ][ xxxxxxxx ]
TW2:  [ xxxxxxxx ][ xxxxxxxx ][ xxxxxxxx ]
TW3:  [ xxxxxxxx ][ xxxxxxxx ][ xxxxxxxx ]

trigger condition
      [ TWO OR TW1 OR TW2 OR TW3 ]
data qualification [ off ]

```

```

*****
*
* Now the cursor must reside on [INT] field. If the cursor is
* invisible, you should re-boot the PC system and run ALA/i
* again.
*
*****

```

The first line of this screen is the Main Menu Bar which consists of Mode, Install, Get and Update functions. Below this menu bar, there are three message lines that indicate the hardware configurations of current AOS. On the mid-part of the screen, a double-line enclosed area is the Operating Window of FORMAT MODE, that includes the acquisition configuration and the trace template.

4.2 Acquisition Configuration

The acquisition configuration contains two important messages those are channel numbers and the memory depth in each channel. Those two factors change according to different trace template setting. If you use 40 ns/clock or below as the sample clock, then you can get 24 channels at most and 2044 bits per channel. If you select 10 ns/clock, then only 8 channels can be used, but you will have 8176 bits per channel. Here is a acquisition configuration table in the following:

Data Qualification [OFF]			
Sample clock	10 ns/clock	20 ns/clock	>= 40 ns/clock
channel number	8	16	24
memory depth	8176	4088	2044

Data Qualification [ON]	
Sample clock	>= 40 ns/clock
channel number	16
memory depth	2044

4.3 Trace Template

Below the acquisition configuration is the trace template. In this area, there are several parameters which constitute the ALA trace conditions. AOS provides 8 sets of trace template, you can get or update any one of them. Here we want to describe the operation of each parameter input.

4.3.1 Sample Clock

Let's get start from the first item of trace template, that is the sample clock. Now the cursor must stay on [INT] which indicates you use the internal clock to sample the data. You can press <F5> or <F6> to select different one. ALA provides two types of clock function:

INT: Internal Clock
EXT: External Clock

When the sample clock is INT clock, it is called as asynchronous sampling. Based on Sampling Rate Theorem, if you want to get correct signals of test points, the sample frequency should be at least two times as high as frequency of the test points. The higher of sample frequency you choose, the higher correction of signals of the test points you can get.

However, if the sample frequency which you choose is higher, the time of fetching data will be less; therefore, when you select a sample period of INT clock, you must make a trade-off between frequency of the test points and the recording time of sampled data.

In general, when you choose INT clock to sample data, there could be possible occurring variance for same test points in different time because no regular relationship exists between INT clock and input signals. In internal clock mode, you can use <F5> or <F6> to select one sample period from 18 settings.

When the sample clock is EXT clock, it is called as synchronous sampling. You have two alternatives:

- RISING** : Data is sampled by the RISING edge of external clock.
- FALLING** : Data is sampled by the FALLING edge of external clock.

Although ALA offers each Logic PODs having one EXT probe, actually, only the EXT probe of POD A is enabled.

When you use EXT clock, please refer to set up time and hold time described in Section 1.6, be sure that the input signals are stable within the time period.

4.3.2 Input Threshold

ALA provides three types of input threshold voltage:

TTL: +1.5 volt
ECL: -1.3 volt
variable: -10.0 to +10.0 volt by the step of 0.1 volt

<F5> and <F6> are used to select different type of threshold and voltage in the variable type.

Please note: Different threshold setting maybe get different outcomes (refer to Figure 4-1).

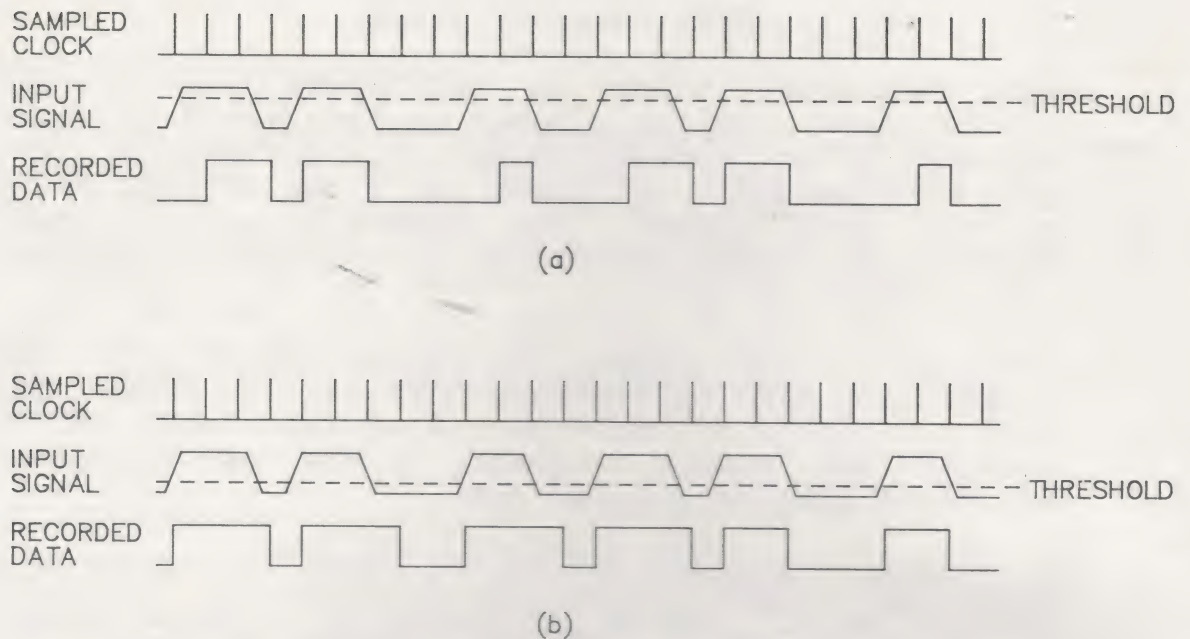


Fig. 4-1 Different Recorded Outcomes because of Different Input Threshold

4.3.3 Trigger Displacement

This function is used to locate the trigger point in the trigger memory. For example if you edit [100] in this field, and when you complete the data trace, you will find the trigger point is located at the 100 position of the trace memory, in other word you can see 100 data (0 to 99) before the trigger point.

4.3.4 Trigger Word

Trigger word is used to define the desired data pattern in each POD of ALA. Data pattern can be "0", "1" or "x" (don't care) in each bit within any POD. ALA provides 4 trigger words at most, the available number of trigger words changes with the FORMAT MODE trace template, if you select 10 ns/clock as the sample period, then the trigger word is only one available.

4.3.5 Trigger Condition

Trigger condition is one of the most fantastic function of ALA system. Three trigger commands and available trigger words can be combined over 4000 trigger conditions. Three trigger commands are "ARM" (if-then), "AND" and "OR". Here are some examples:

TWO ARM TW1: ALA starts triggering when TW0 and TW1 are met

in order, even if other events occur between the trigger events (refer to Figure 4-2a).

TWO AND TW1: ALA starts triggering when TWO and TW1 are met without in order (refer to Figure 4-2b).

TWO OR TW1 : ALA starts triggering when TWO or TW1 is met (refer to Figure 4-2c).

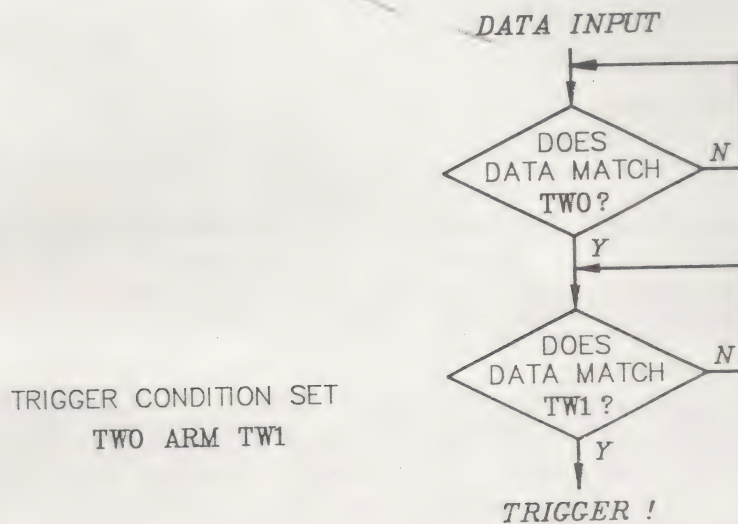


Fig. 4-2a Flow Chart of "ARM" trigger command

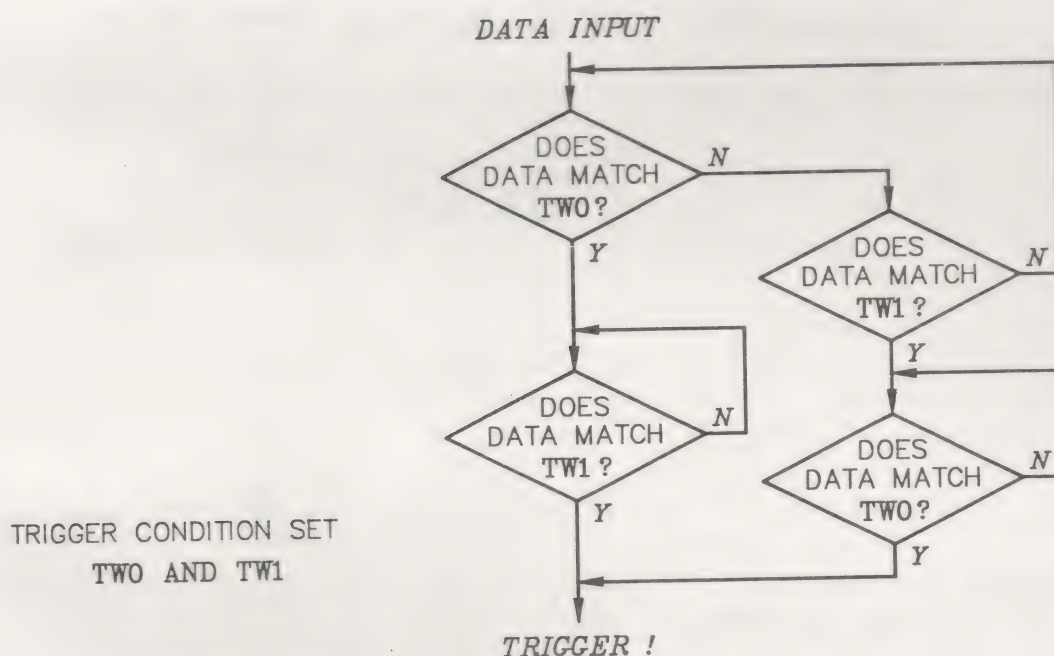


Fig. 4-2b Flow Chart of "AND" trigger command

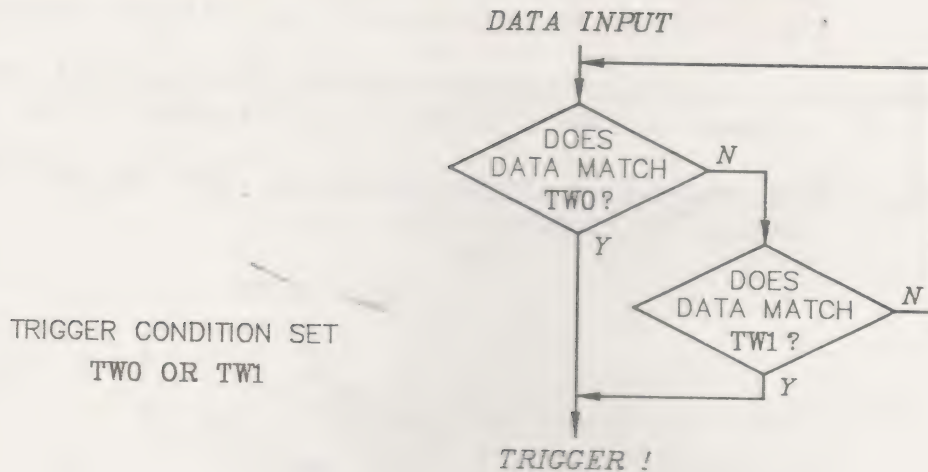


Fig. 4-2c Flow Chart of "OR" trigger command

The execution priority of three trigger commands is ARM first, AND second, OR last (The situation is similar to exponential, multiplier, and add). Once you complete the setting, AOS will distinguish the priority by adding parentheses automatically. The contents of one parentheses could be regarded as a trigger word, therefore, a complex trigger condition will be simplified very easily. For example,

(TWO ARM TW1) OR (TW2 AND TW3)

Its process will be simplified as Figure 4-3.

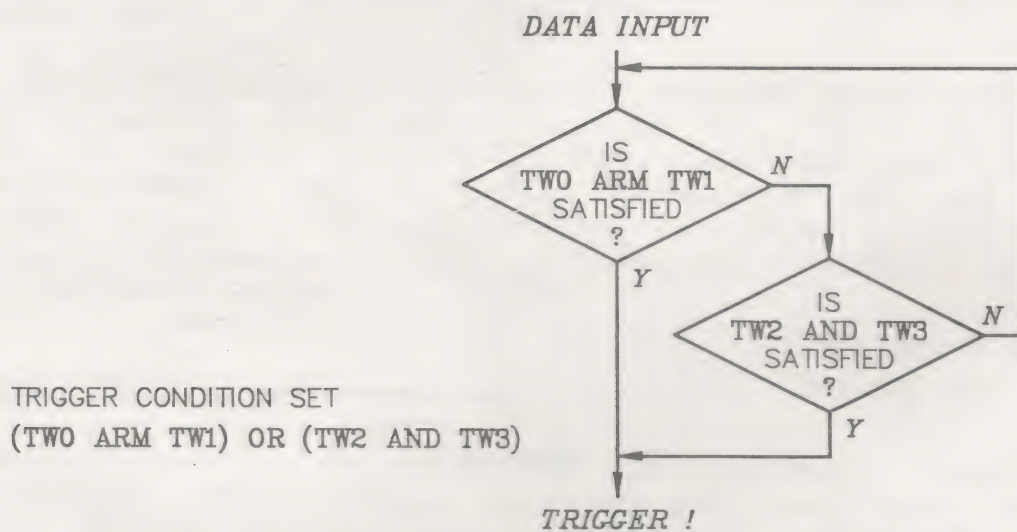


Fig. 4-3 Flow Chart of a Complex Trigger Condition

However, it is required to exist at least one trigger word in the trigger condition. And, the same trigger word is allowed to occur repeatedly.

In this field you can press the DIRECTION key to move the cursor, and use <F5> or <F6> to select the appropriate trigger word or trigger command. Space bar <Space> is a special key to delete the right-hand side trigger conditions.

4.3.6 Data Qualification

Data qualification is a special function of our ALA system. When this function is enabled, then POD C will be regarded as the qualifier, and ALA only records the data of POD A and POD B when the data of POD C matches the qualifier.

In this field, you can use <F5> or <F6> to enable or disable the data qualification function. When the data qualification is enabled, then qualifier POD C will appear on the bottom of this screen. In this qualifier field, you can press the DIRECTION key to move the cursor and key in the state ("0", "1" or "x") you want.

Figure 4-4 shows a data qualification example to explain the data interval in the memory has not regular relationship with the sample clock.

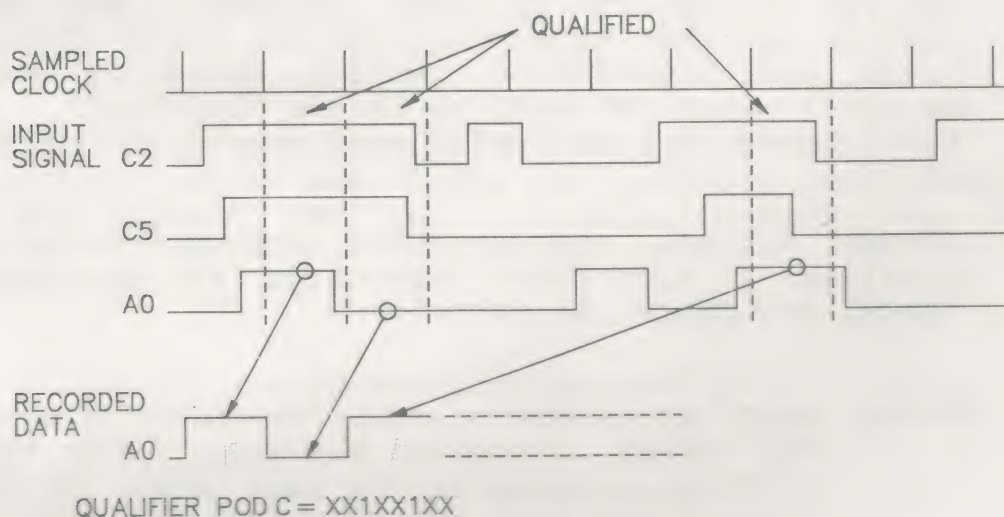


Fig. 4-4 Data Qualification Example

4.4 Main Menu Bar

Main menu bar in the FORMAT MODE consists of several functions. It looks like the following:

Mode Install Get Update

You can find the highlighted capital letters are M, I, G and U. Use the cursor key or use the SHORTCUT key to invoke the function you want. Here we want to explain the meaning and the operation of each function in detail.

4.4.1 Mode

This function is used to change the operating MODE of ALA. When you invoke this function, a pull down menu will appear on the bottom of MODE, it looks like the following figure.

TRACE
REP TRACE
FORMAT MODE
TIMING MODE
LIST MODE
DOS MODE
QUIT

Now you can use the up down DIRECTION key to move the cursor to the mode you want and press <Enter>, or just press the highlighted capital letter in each mode. For example, when you want to invoke "DOS MODE", you can move the cursor to "DOS MODE" and press <Enter> or just press <D>.

Except FORMAT, TIMING, LIST and DOS four modes, ALA provides 3 additional functions to the user. They are TRACE, REP TRACE and QUIT.

TRACE TRACE is a command function which is used to let the ALA start to record the data. When the command is invoked, a message box will appear on the screen to display the data recording information. After trace complete, ALA will enter TIMING MODE to show the timing diagram on the screen.

User can't start TRACE in DOS MODE.

Regarding to the detailed trace procedure of ALA system, please refer to the Appendix A: "Trace

Procedure".

REP TRACE

REP TRACE is the abbreviation of repeat trace. This function is used to initiate the TRACE function multiple times. When this function is selected, a dialog box will appear on the screen:

Repeat Trace	
Repeat :	[1] times
Delay :	[1] seconds
<div>Trace Cancel</div>	

The first parameter indicates how many times you want to initiate the TRACE action. The second parameter indicates to delay how many seconds between two TRACE actions.

"REP TRACE" function can be used in the TIMING MODE and LIST MODE only.

QUIT

"QUIT" function is used when you want to quit the ALA operation and return to DOS.

4.4.2 Install

"Install" is an alternative way to customize AOS to your PC system, so if you change the hardware configuration in your PC, please run this function before any further operations. When you invoke this function, then a dialog box will appear, that is:

System Config	
I/O address	: [350 - 35F]
Video type	: [Hercules]
Colors set	: [Mono]
Printer type	: [EPSON MX-80]
Extended code	: [OFF]
<div>OK Cancel</div>	

From the above box, we know that the input area is the System Configuration information, and the action area is two command buttons: "OK" and "Cancel". At this time, you can look up the Q-Ref line to find out what keys can be used to edit the System Config area. The input method is exactly the same as that in the SYSTEM INSTALLATION section, so here we don't want to explain it again.

4.4.3 Get

"Get" function is used to get which one FORMAT MODE trace template to be used. When this function is invoked, a pull down menu is shown, like the following:

```
default
1:>QUICK320
2:
3:>
4:
5:
6:>10NSEC
7:
8:
```

Except default, AOS provides 8 additional buffers to keep your custom trace templates. The character ">" indicates that template is not empty, i.e., that template is updated at least once before, so you can get it to use. No ">" character indicates that is a unused empty template, AOS won't let you to select it. When you want to get one non-empty template, you can use the DIRECTION key to select it and press <Enter> or just press the corresponding digit. If you want to reset all the parameters to its initial value, you can get the first one "default".

4.4.4 Update

Contrary to "Get" function, "Update" is used to write a custom trace template back to the buffer. If you invoke this function, then a pull down menu will be shown on the screen:


```
1:>QUICK320
2:
3:>
4:
5:
6:>10NSEC
7:
8:
```

This pull down menu is almost the same as that of "Get" function without the "default" on the first line. Character ">" also indicates that is a used, non-empty template. You can move the cursor to write current trace template to an empty buffer or over-write to a non-empty buffer. When you select one template buffer to write to, then a small prompt box will appear to ask you to input the template buffer name. You can key in 8 characters at most or just press <Enter> to leave it blank.

CHAPTER 5

TIMING MODE

5.1 Descriptions

TIMING MODE is used to display the timing diagram of the traced data. In CGA video type, you can only have 16 channels at most. In other type, you may have 16, 24 channels on one screen simultaneously. In this mode, AOS provides one cursor and two pointers to help you to analyze the timing waveform of the traced data. Besides, you can edit the channel label for later review, or change the sequence of channel number to group the active channels to have a clear screen.

5.2 Operating Window

Except the Main Menu Bar and the Q-Ref line, the mid-part of the screen is the Operating Window of the TIMING MODE. In the upper block of this Operating Window, there are some messages:

Magnification : magnification factor is to magnify the displayed timing diagram. Each channel on the screen can display 512 data (max.) at one time. You increase the magnification, the displayed scale between two data will increase, and the numbers of data display will decrease relatively.

The available selections are x1, x2, x4, x5,, x64.

Display : indicates the location of the displayed data in the trace memory.

Window Move : window move speed factor.

50 ns/clock : period of the sample clock.

The left column of this screen is the displayed channel label and the sequence of channel number. This field can be edited by "sequence" and "Label" functions.

The mid-part of this Operating Window is the timing diagram of the traced data. In timing analysis, you usually need to know the relative relationship between two particular points, so, AOS offers one cursor and two pointers.

The cursor is a vertical dotted line on the screen, you may use cursor DIRECTION keys to move it; also, use <+>, <-> to

change its moving speed. A symbol "Y" indicates the location of trigger position. A complementary symbol "Λ", called reference pointer, is used to indicate the reference position.

The bottom block is used to keep the timing relationship between two pointers and the cursor. They are:

$C = 0$: Location of the cursor in the trace memory.

$\Lambda = 0$: Location of the reference pointer in the trace memory.

$C - \Lambda = 0$: The delta-location between the cursor and the reference pointer.

duration : This field is shown in internal clock mode, the number is calculated by the $(C - \Lambda)$ times the internal clock period. If qualify is enabled, this field displays the message "qualified".

In the same way, AOS provides one Q-Ref line at the last line of this mode. This Q-Ref line indicates the available function keys at this moment.

5.3 Main Menu Bar

In the TIMING MODE, AOS also provides a Main Menu Bar on the first line of the display. They are:

Mode : mode change.

Search : search a data pattern in the trace memory.

seQuence: edit or delete the sequence of displayed channel number.

Label : edit the label of each channel.

pOsition: control the cursor movement or the Operating Window scrolling.

Display : change the timing display mode to 16, 24 channels.

Print : print the timing diagram.

5.3.1 Mode

This function is exactly the same as the "Mode" function in the FORMAT MODE. Please refer to it.

5.3.2 Search

This function is used to search a data pattern in the trace memory. When this function is activated, a pull down menu is shown:

All channels
Displayed channels
Repeat search

AOS provides two search manners. One is to search a specific data pattern in all channels, the other is to search in displayed channels only. The following is the brief operation guide of each manner.

All channels:

This function is used to search a data pattern in ALA all channels. When you select this function, then a dialog box will appear to ask you to edit the search pattern of 24 channels, like the following:

Search					
HL		76543210			
POD A	[]	[xxxxxxxx](BIN)
POD B	[]	[xxxxxxxx](BIN)
POD C	[]	[xxxxxxxx](BIN)
Execute			Cancel		

You can press the DIRECTION keys to move the cursor and key in the state ("0", "1", or "x") you want. The right column of this dialog box is the input radix of each POD. You can change the input manner from BIN to HEX by pressing <F5> or <F6>. When you finish the above procedure, then press <Tab> to switch the cursor to the action area to execute the search function or select "Cancel" to abandon it.

Displayed channels:

This function is used to search the displayed channels only. When this function is selected, a dialog box

appears on the left side of the screen, and asks you to edit the search pattern in the sequence of the displayed channel number. The same way as searching in all channels, press <Tab> to switch the cursor to execute the search function or just cancel it.

Repeat search:

This function is used to execute the search function again.

In general, if the AOS can find out data which are in the memory after the cursor position to meet with the search pattern, the cursor will move to this specific point automatically. If not, there occurs a message "search failure".

5.3.3 sequence

For the convenience sake, 8 channels of timing diagram are grouped as one region. So if you display 16 channels, you have 2 regions, if you display 24 channels then you have 3 regions on the screen. You can invoke this function to change or to delete the sequence of channel number of each region. If your current display mode is 16 channels, then a dialog box following this function looks like:

Sequence Editor	
region 0	region 1
A0	B0
C5	--
A2	B2
--	A2
A4	B4
B2	B5
A6	--
A7	C0
OK	Cancel

In this box, the input area contains two regions. You can move the cursor to the destination position and key in the channel number which you want to display, or just press <Space> to delete that field. "---" sign is used to indicate that field is deleted. When you finish the input area, press <Tab> to jump to the action area and confirm the change or just cancel it.

5.3.4 Label

Label function is used to give a reference notation for each channel. When this function is activated, a dialog box appears on the screen to ask you to edit the label of each channel.

Label Editor			
A0	SYS CLK/	B0	_____
A1	_____	B1	_____
A2	_____	B2	_____
A3	_____	B3	_____
A4	_____	B4	_____
A5	_____	B5	_____
A6	_____	B6	_____
A7	_____	B7	_____
OK		Cancel	

You can use the DIRECTION keys to move the cursor to any channel and key in the reference label you want. Each channel accepts 8 characters at most.

^<C> (Ctrl C) is a special function key to clear all the labels.

If you finish the input area, please press <Tab> to switch the cursor to the action area to confirm the change ("OK") or abandon ("Cancel") it.

5.3.5 position

This function is used to place the cursor, pointers or the display window to a new position. You can select the corresponding function through the pull down menu which is as the following:

reset Reference pointer
return to reference Point
return to Trigger point
relocate display Window
set window Move speed

There are five functions in the pull down menu. Here we want to discuss them in detail.

reset Reference pointer

Place the reference pointer "λ" at the cursor position.

Note: This function is the same as <F2> in the current MODE.

return to reference Point

Place the cursor to the reference pointer position.

return to Trigger point

Place the cursor back to the trigger point position.

relocate display Window

This function is used to relocate the display window to a new starting location in the trace memory. When you choose this function, a prompt box is shown right below this function, prompts you to key in a new starting location of the display window.

set window Move speed

When you press <Ctrl> + <right arrow key> then you can find the display window will shift to right side by the number of window move speed factor. As the same way, when you press (Ctrl> + <left arrow key> then you shift the display window to left side. In this function, you can change the speed factor by directly editing.

No matter which method you use to change the window move speed factor, its value has limits. The upper limit is half of the memory depth, and the lower limit is 1.

Please note: When the cursor is at the most left or most right side of the display window, once press cursor DIRECTION keys, the timing diagram will scroll 1/8 window to the left or right side automatically. Besides scrolling, the cursor will also move to the left or the right side.

5.3.6 Display

16 channels
24 channels

In this function you can select the 16 or 24 channels mode on one display window. But if you use a CGA display adaptor, you can only have 16 channels on one screen simultaneously.

5.3.7 Print

When you make a hardcopy of TIMING MODE, then you will get a timing diagram along the printer head direction. This "Print" function is exactly used to print out a stream of timing diagram along the paper advancing direction. When you select this function, a dialog box will be shown on the screen, like the following:

Print Utility	
Range :	[0] - [511]
Form :	[continuous]
<hr/>	
Print	Cancel

There are some parameters must be set.

Range: indicates the data range in the trace memory to be printed out. The former is the starting location and the latter is the ending location.

Form : There are two print-out forms, one is "continuous" and the other is "split". "continuous" is used when you use a continuous paper and you want to get a continuous timing diagram from the starting location to the ending location. "split" is used when you use the cut sheet paper or you want to get split form of timing diagram. You can press <F5> or <F6> to select either "continuous" or "split" form to satisfy your requirements.

When you finish the print utility parameters input, you can press <Tab> to switch the cursor to the action area, and select "Print" to start the printing, or select "Cancel" to abandon the input.

CHAPTER 6

LIST MODE

6.1 Descriptions

Unlike the timing diagram in the TIMING MODE, the LIST MODE puts the traced data on the screen in state form, and the state form can be Binary, Octal, Hexadecimal or ASCII format. In this mode, ALA also provides a lot of powerful functions to help you to analyze the traced data. When you enter this mode, you can find a screen like the following:

Mode	Search	Group	poLarity	pOosition	Display	Print
LIST MODE						
Display [0000] - [0031]			Page Move [0016]			
++-+---++	---++++++	++-----++	++-+---++ ---++++++ ++-----++			
AAAAAAAA	BBBBBBBB	CCCCCCCC	AAAAAAAA	BBBBBBBB	CCCCCCCC	
76543210	76543210	76543210	76543210	76543210	76543210	76543210
HEX	BIN	ASC	HEX	BIN	ASC	
0000	A0	00000000	.	0016	B0	00000000
0001	A0	00000000	.	0017	B0	00000000
0002	A0	00000000	.	0018	B0	00000000
0003	A0	00000000	.	0019	B0	00000000
0004	A0	00000000	.	0020	B0	00000000
0005	A0	00000000	.	0021	B0	00000000
0006	A0	00000000	.	0022	B0	00000000
0007	A0	00000000	.	0023	B0	00000000
0008	A0	00000000	.	0024	B0	00000000
0009	A0	00000000	.	0025	B0	00000000
0000	A0	00000000	.	0026	B0	00000000
0011	A0	00000000	.	0027	B0	00000000
0012	A0	00000000	.	0028	B0	00000000
0013	A0	00000000	.	0029	B0	00000000
0014	A0	00000000	.	0030	B0	00000000
0015	A0	00000000	.	0031	B0	00000000

F1-Help F7-Repeat Search F10-Main Menu F.T.D-MODE

The upper most line is the Main Menu Bar, the center-part of the screen is the Operating Window, and the last line is the Q-Ref line. Now the cursor must reside in the Operating Window, you can use <F10> to switch the cursor to the Main Menu Bar. In the following sections of this chapter we want to explain the meaning as well as the operation of each function.

6.2 Operating Window

Refer to previous section, we find the first line of the Operating Window is the display location and the page move factor. These two parameters can be changed in the "pOosition" function of Main Menu Bar. Below the first line, there is the traced data area. In this area you can find the traced data is displayed into two consecutive parts, the left and the right. In each part, you can find the left column is the display location, and the upper-side message is the display group. ALA provides 3 groups in this MODE, in each group you can combine any 8 channels from the available channels of ALA. You can change the channel polarity just like use an additional inverter in the Logic POD, and you can change the display radix at your own convenience.

6.3 Main Menu Bar

The first line of the LIST MODE display is also the Main Menu Bar which contains several functions:

- Mode : change the operating mode.
- Search : search a data pattern in the trace memory.
- Group : change the display channel in each group.
- poLarity: change the display polarity of each channel.
- pOosition: control the cursor movement or the window scrolling.
- Display : change the display mode to 25, 43 or 50 lines.
- Print : use the printer to print out the traced data as the same format as the display of LIST MODE.

Like the operation in the other mode, you can select the Main Menu function by use the DIRECTION keys, or use the SHORTCUT key to invoke any function you want. Some functions have the same operation with the other mode, but some are quite different. The following is the description about the operation and the meaning of each function.

6.3.1 Mode

Please refer to the "Mode" function of FORMAT MODE.

6.3.2 Search

Please refer to the "Search" function of TIMING MODE.

6.3.3 Group

ALA has three hardware Logic PODs, as well as AOS provides three groups display in the LIST MODE. Unlike the hardware Logic POD, you can select any 8 channels from 3 Logic PODs to combine as a group. When this function is activated, a dialog box is shown on the screen, it looks like the following:

Group Editor									
	MSB							LSB	
	7	6	5	4	3	2	1	0	
group 0	A7	A6	A5	A4	A3	A2	A1	A0	HEX
group 1	B7	B6	B5	B4	B3	B2	B1	B0	BIN
group 2	C7	C6	C5	C4	C3	C2	C1	C0	ASC
OK Cancel									

In this box, you can move the cursor to anywhere and edit the channel number you want or delete it within any group by pressing the <Space>. Another parameter is the group display radix, you can press <F5> or <F6> to select appropriate radix (BIN, OCT, HEX or ASC) for each group. If you finish it, press <Tab> to switch the cursor to the action area to confirm the change or just cancel it.

6.3.4 poLarity

This is a special function in the LIST MODE. As usual, the channel signal is displayed in polarity "+", that is the polarity of displayed channel is the same as the input signal. On the contrary, if you select "-", then you will get an inverted signal on the display, just like you add an additional inverter at the Logic POD. When you invoke this function, a dialog box will appear on the screen to ask you to key in the appropriate polarity you want.

Polarity Editor					
A0	+	B0	-	C0	-
A1	-	B1	+	C1	+
A2	+	B2	-	C2	-
A3	+	B3	+	C3	+
A4	-	B4	+	C4	+
A5	-	B5	-	C5	-
A6	+	B6	+	C6	-
A7	+	B7	+	C7	+
OK			Cancel		

In the above box, you can move the cursor to anywhere and key in the channel polarity "+" or "-". When you have done the editing job, press <Tab> to switch the cursor to the action area and to confirm the change or cancel it.

6.3.5 position

This function has the same meaning as in the TIMING MODE. When you invoke this function, then a pull down menu

return to Trigger point relocate display Page set page Move speed

will ask you what job you want to do. They are:

return to Trigger point

Place the cursor back to the trigger point position.

relocate display Page

This function is used to relocate the display page to a new starting location in the trace memory. When you choose this function, a prompt box is shown right below this function, prompts you to key in a new starting location of display.

set page Move speed

When you press <PgUp> or <PgDn>, then you'll find the display window will scroll up or down by the number of page move speed factor. In this function you can change the speed factor by directly editing.

As the same manner in "pOosition" function of TIMING MODE, you can use the DIRECTION keys to move the cursor to the needed function and press <Enter> or just press the SHORTCUT key directly to invoke any function.

6.3.6 Display

When this function is activated, a pull down menu

Standard 25 lines
EGA 43 lines
VGA 50 lines

prompts you to select what the display mode you want. If you are using a VGA display adaptor, then you can select "VGA 50 lines" or "Standard 25 lines". If you use an EGA adaptor, you can select "EGA 43 lines" or "Standard 25 lines". If you use a Hercules or CGA display adaptor, then you can only select "Standard 25 lines" on the screen.

6.3.7 Print

This function is used to print out the LIST MODE traced data. A dialog box

Print Utility	
Range :	[0] - [511]
Form :	[split]
Print	Cancel

appears on the screen to ask you to key in the parameters.

Range: The former is the starting location and the latter is the ending location.

Form : Print out form. AOS only provides split form in the LIST MODE printing.

Use the commands in the action area to start or cancel printing.

CHAPTER 7

DOS MODE

7.1 Descriptions

This mode is one of the most important features in ALA. Under this mode, you can load or save the traced data and the FORMAT MODE trace template from or to a disk, and you can dir any drive or any directory, rename or erase any file just like under the DOS environment. The following sections will give you a more detailed explanation about the operation and the meaning of each function in this mode.

This is the only mode ALA doesn't provide any information in the Operating Window. So before you invoke any function from Main Menu Bar, the Operating Window will keep blank itself.

7.2 Main Menu Bar

The Main Menu Bar in this mode is quite different from that of any other mode. It looks like:

Mode	Utility	Load	Save	Edit
------	---------	------	------	------

7.2.1 Mode

With the same operation as in the other mode, but here you can neither start TRACE and REP TRACE directly, nor go to the TIMING or LIST MODE if the trace memory is empty.

7.2.2 Utility

"Utility" function contains a lot of DOS commands, such as DIR, RENAME, ERASE and SHELL. You can move the cursor to select the appropriate command to do the job you want. If you invoke this function, then a pull down menu will be shown on the screen:

Dir
Rename
Erase
Shell

AOS provides a special function "Shell" in this new version. Here we will explain the meaning of the operation

of each function.

Dir This function can be used to DIR any directory or any drive. When you select this function, then the screen will show a Prompt Box to ask you to key in the dir mask. You may key in the dir mask you need to list the directory, or you can just press <Enter> to list the current directory contents.

Rename When you invoke this function, then a List Box will appear on the screen to show you all the files under the current directory. You can use the DIRECTION keys and <Enter> to select the file you want to rename. If you select a specific file, then AOS will display a Prompt Box to ask you to input a new filename. If you key in one correct filename, then AOS will rename the specific file and update the List Box.

Erase "Erase" is the same as ERASE or DELETE command under the DOS environment. When you select this function, the screen will display a List Box that lists all the files under the current directory. If you select one file to be deleted, then AOS will query you to confirm the action. You can key in <Y> (Yes) to confirm "Erase" action or key in <N> (No) to abandon it.

Shell This is the additional function in this version of AOS. This "Shell" function is used whenever you want to execute a DOS program or command without quitting from AOS. When you invoke this function, then ALA will load another copy of command interpreter into the memory and give a DOS environment to you. When you want to leave the DOS command interpreter and return to AOS, key in the command "EXIT".

Note: Don't run any resident program otherwise that will reside in the memory.

7.2.3 Load

"Load" function is used to load an ALA data file or an ALA FORMAT MODE trace template file into the memory. When you invoke this function, then a pull down menu prompts you to select what type of file you want to load, like the following:

.ALA file .FMT file

Traced data file is denoted in file type .ALA, while the trace template file is in .FMT. For example, if you want to load a data file to review the traced signal, you should move the cursor to select the .ALA file then press <Enter> to activate it. A moment later, a prompt box is displayed on the screen to ask you which file you want to load. That is:

File Name *.ALA

If you want to load a specific file, then you just key in the corresponding filename. If you press <Enter> instead of keying in any filename; then a list box, containing all the files matching the filespec in the current directory, will be shown on the screen to let you select what file you want to load.

In the file list box, as in section 3.8, you can find the drive area in the above and the file list area in the center region. You can press <Tab> to switch the cursor between these two areas. In the drive area, you can select from what disk drive you want to load. In the file list area, you can also use the DIRECTION keys and <Enter> to load what file you want.

The last line of this list box keeps the free space message which indicates how many files in the current directory and how many bytes available in the current drive.

If there are some sub-directories in the current directory and you want to go to one of them, then just move your cursor to that sub-directory and press <Enter>. On the contrary, if you want to go to the parent directory, move your cursor to the line with the name [...] and press <Enter>.

When AOS loads a .ALA file into the memory, then AOS will go to the TIMING MODE directly. If AOS loads a .FMT file into the memory, then it will go to the FORMAT MODE automatically.

7.2.4 Save

Contrary to "Load" function, "Save" is used to write a

trace data or 8 FORMAT MODE trace templates into a disk. The former is denoted in file type .ALA and the latter is in .FMT. The .ALA file contains several messages, they are traced data, one effective trace template and comments. While .FMT file contains only 8 trace templates. So you can find a .ALA file will occupy much more space than a .FMT file.

7.2.5 Edit

This function is used to edit the user's comments to a traced data or to any AOS data file in the disk drive. When this function is activated, a pretty big window will be shown on the screen, then you can edit your own comments. When you finish this editing job, you should press <Tab> to switch the cursor to the action area to confirm the change or abandon it.

CHAPTER 8

HARDCOPY

Whenever you want to dump your current screen to the printer, you can press <Shift> + <PrtSc> to get a screen hardcopy.

If you are using an IBM compatible printer and you turn "ON" for the Extended code while you install the AOS to your PC system, then you will get a hardcopy exactly the same as on the screen. If you select "OFF" in the Extended code term, then you will get only text characters in your hardcopy without the extended code characters, such as single and double block border, ..., etc.

CHAPTER 9 SET COLOR

9.1 Descriptions

```
*****
*
*   Note: This SETCOLOR program must be run under the EGA or
*   VGA display adaptor. Otherwise the color on the
*   display is incorrect and the PC system maybe halt
*   if you want to adjust the color of TIMING MODE.
*
*****
```

The most wonderful feature of current version AOS is the color can be set by the user according to his own favor. If you use the EGA or VGA display adaptor, as mentioned in Installation chapter, AOS provides you a lot of color sets to be used, they are

Mono
Default
Turquoise
Magenta
Custom

Except former four defined color sets, AOS provides you additional one which is "Custom". You can adjust the color combinations through the color set program in the AOS disk.

9.2 Operation

If you want to change the color combinations in the color set "Custom", run the color set program under DOS,

A>SETCOLOR

then a logon screen appears and shows some warning messages to indicate this program must be run under the EGA or VGA display adaptor otherwise the user will get some troubles. When you press <Enter> to pass the logon screen, then a Color Menu will be displayed on the screen.

In this Color Menu, you can find there are a lot of functions. Now you can select any function you want or press <Esc> to quit this color setting process and return to DOS. In the following sections we are going to explain the meaning and the color set operation of each function.

Color Menu
Timing
List
Format
Dos
Window
Status Line
Menu
Help
Input Box
Error Box
Message Box
Initial
Quit/Save

If you select one function from the Color Menu, then the screen will show one pop-up sub-menu and a target window. For instance, if you select "Format" in the Color Menu, then a sub-menu, like the following,

Border
Title
Config
Normal text
Field
POD ID

will pop-up on the Color Menu, and the target window of this case is on the upper-left corner of FORMAT MODE screen. Above sub-menu tells you what color items could be changed in the FORMAT MODE; and by the help of the target window, you can very easily recognize the meaning of each item in the sub-menu. If you choose any one item from above sub-menu, then a color matrix will be displayed on the screen to let you select the color you want for that chosen item. In that color matrix, you can press the cursor DIRECTION keys to move the pointer (a small block) to anywhere, when you move the pointer, the color of the chosen item will be changed at the same time. When you find your favorite color, then press <Enter> to change it. As the same way, you can set the color of each item in the sub-menu under FORMAT MODE. If you finish all or part of the items in this sub-menu, and you want to leave the color setting of this FORMAT MODE, just press <Esc> to quit and return to the Color Menu.

9.3 Color Menu

From the previous section, you know the Color Menu will be shown on the screen if you run the SETCOLOR program. In this section we want to explain the meaning of each function in the Color Menu.

Timing	To change the color combinations of TIMING MODE.
List	To change the color combinations of LIST MODE.
Format	To change the color combinations of FORMAT MODE. Please refer to section 9.2.
Dos	To change the color combinations of DOS MODE.
Window	This function is used to change the color of Operating Window of each Mode.
Status Line	"Status Line" includes the Q-Ref line and all the status messages displayed in this line. This function can be used to change the color of above items.
Menu	To change the color of pull down menu.
Help	From the word "Help" you know this function is used to change the color of On-line Help Window.
Input Box	To change the color of Dialog Box and Prompt Box.
Error Box	To change the color of error message display box.
Message Box	To change the color of AOS message display box.
Initial	Let you to select what color set as the initial "Custom" color combinations. You can select "Default", "Turquoise" or "Magenta".
Quit/Save	This function is used when you finish the color setting process and you want to save it into the disk. If you select this function, then you will be queried to save or not, and if you select "Yes" then your color combinations will be saved as "Custom" in color set. If you reply "No" then nothing will be changed.

APPENDIX A

TRACE PROCEDURE

ALA itself has many complex operations for trace procedure. The following sections will describe the operation in detail.

* Procedure of TRACE

Upon entering TRACE, AOS will send all the parameters which are set previously to AU (Analyzer Unit), then, start AU. From now on, AU takes over the control of operation, and AOS just plays as a supervisor to monitor the AU operation and displays current information on the screen.

AU will take some time to fetch data into the memory. The time period is dependent on the Displacement you set in the FORMAT MODE.

If over 5 seconds, this procedure still can not be completed, you will find a message on the screen

- - - slow clock - - -

It means you select a very slow EXT clock. Even though "slow clock" has occurred, ALA will not stop working unless you decide to abort the trace job.

If AU can complete fetching the data within 5 seconds, next step, AU begins to compare the data with your trigger condition, and the screen will display

- - - waiting for trigger - - -

When the data match your trigger condition, we call it as Trigger. And then, AU will fill the memory with the sampled data. At this moment, you will find the screen showing

- - - data recording - - -

When the memory is full of the data, trace completes. A message will be displayed on the screen.

- - - trace complete - - -

It is possible for you to find the last message (trace complete) only if your setting for trace is working very quickly and successfully.

* Trace - Abort

Under the trace procedure, the only way to let AU give up

working is to press <Esc>. After that, the screen will show

- - - trace abort - - -

However, the data on the current screen are trace results which are left last time.

After you abort trace, the screen still stay at the original MODE. For instance, when you begin trace from the TIMING MODE, you abort it later, the screen will still stay in the TIMING MODE.

* Trace - Complete

If trace is working from the FORMAT MODE, once the trace completes, ALA will jump to the TIMING MODE automatically, and show the timing diagram on the screen.

If trace is working from the TIMING or LIST MODE, the screen will stay at the original mode, and display the results.

APPENDIX B

FORMAT OF ALA DATA FILE

In the DOS MODE, AOS can load or save a .ALA data file from or to a disk drive very easily. Some users may feel curious about the format of this kind of file. In this appendix we will explain how this data file is organized. Maybe users can do some their own additional or post processes to increase the application field of ALA system.

*.ALA file format

AOS 3.00

file size = 9278 bytes

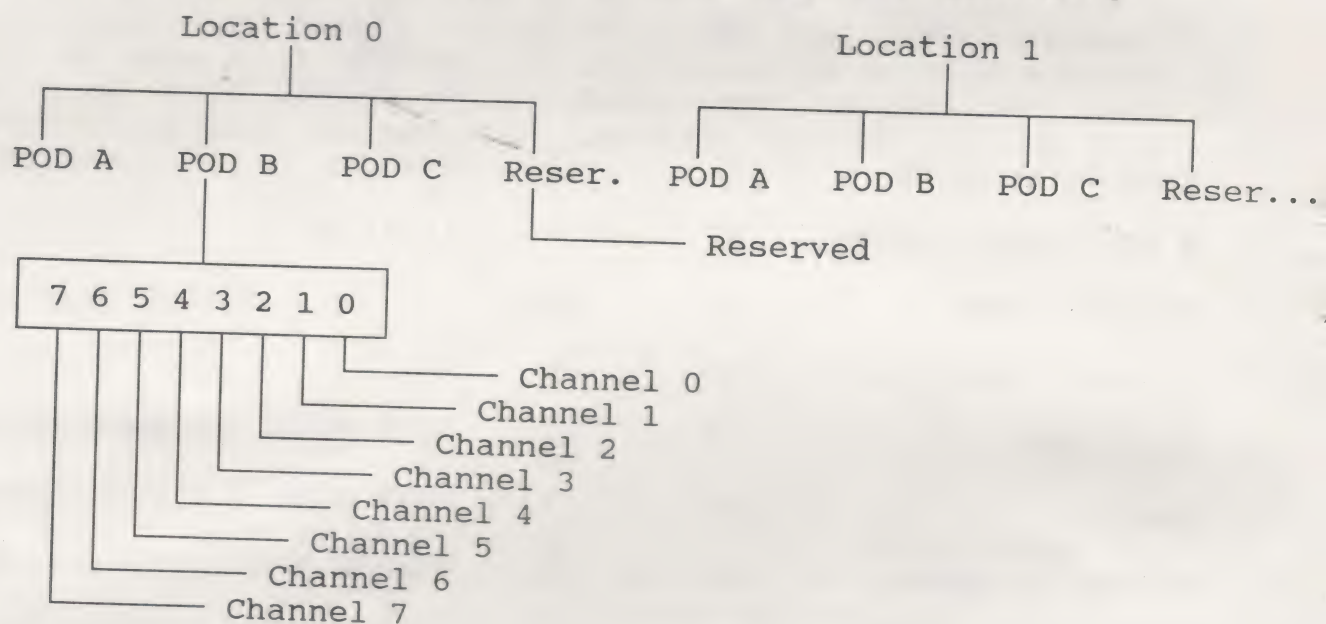
Field Name	Offset	Size	Description
ALA file ID	0	5	Version information
Qualify	5	1	0: Qualify is disabled 1: Qualify is enabled
Magnification	6	2	Integer (1, 2, 4, 8, 16, 32, 64)
Configuration	8	1	0: 100MHz 1: 50MHz 2: 25MHz or below, qualify is enabled or external clock
INT/EXT clock	9	1	0: Internal clock 1: External clock
Sample clock	10	2	0: 10ns/clock 1: 20ns/clock 3: 40ns/clock 4: 50ns/clock : : : 17: 2ms/clock
Rising/Falling	12	1	0: Rising edge 1: Falling edge
Reserved	13	1	
Displacement	14	2	Integer

Bits per channel	16	2	Integer
Number of POD	18	2	1: 8 channels 2: 16 channels 3: 24 channels
Threshold type	20	1	0: TTL 1: ECL 2: value
Threshold value	21	6	Real
# of trigger words	27	1	1, 2, or 4
Trigger word	28	32	
Trigger condition	60	16	
Polarity	76	32	LIST MODE (1 byte/channel)
Radix	108	4	LIST MODE (1 byte/group)
Timing sequence	112	32	TIMING MODE (1 byte/channel)
List group	144	32	LIST MODE (1 byte/channel)
Reserved	176	32	
Label name	208	288	TIMING MODE (9 bytes/channel)
Reserved	496	16	
Comment	512	1024	File comment
Traced data	1536	8192	
End of file	9728		

The traced data of a .ALA file is divided into a series and consecutive groups of data. One group is equal to one location when AOS is in the TIMING or LIST MODE. The contents of group is varied with the Acquisition Configuration. Here we want to describe it in detail.

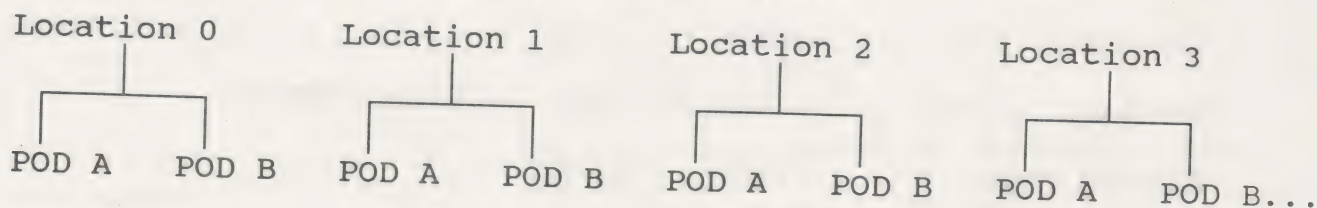
24 channels configuration

Each group contains four bytes of data. Like the following:



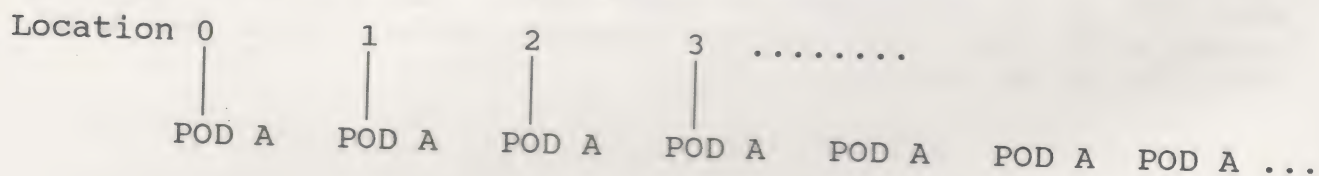
16 channels configuration

Each group contains 2 bytes of data, they are:



8 channels configuration

8 channels configuration only keeps the traced data of POD A, so only one byte in each group.



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ALA24100A Logic Analyzer
ALA Operating System (AOS) for IBM PC Family

7-18-1988

AXELEN INDUSTRIAL INC.
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A). AXELEN has released an advanced version ALA24100A to take the place of the original one ALA24100 in September, 1987.

The AOS of these two models have the same method of operation but with the different drive routines. In order to avoid confusion, the new AOS version no. of ALA24100A will be added an "/A" mark. For example:

AOS 2.30 AOS version no. of ALA24100
AOS 2.30/A AOS version no. of ALA24100A

Be careful to use the correct AOS in your ALA Logic Analyzer.

Although we won't produce ALA24100 any longer, but we will go on the update. So, no matter which model you have, you can get the same guarantee and services from AXELEN till forever.

B). No any OVERLAY file in current version of AOS, so no disk access when you change the AOS MODE.

C). Some powerful functions added in current version of AOS. such as:

- o Can be run under CGA, EGA, VGA, MCGA and Hercules display adaptors.
- o Fully Menu-Driven operating system.
- o Much faster in screen update and timing scrolling during operating in TIMING and in LIST MODE.
- o Trace templates can be load/save from/to a disk.
- o Continuous timing diagram print-out.
- o Can displays 24 channel timing diagram on one screen.

D). Current AOS cancels the 'Start/End' trace function in trace template of FORMAT MODE.

E). You may have two books of ALA Operation Manual, read current version one and take another as a reference.

F). When you newly receive AOS, please run ALA/i (installation) before any operation. The default configurations is set as the following:

- o I/O address : 350 - 35F
- o Video type : Hercules
- o Colors set : Mono
- o Printer type : EPSON MX-80
- o Extended code: OFF

G). Utility 'SETCOLOR' is used to set users' their own favorite color combinations. This utility program can only be run on EGA or VGA display adaptor.